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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/672,271	09/26/2003	Ralph W. Bruce	NC 83,977	8808

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EXAMINER

MAYES, MELVIN C

ART UNIT	PAPER NUMBER
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1734

DATE MAILED: 11/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/672,271

Applicant(s)

BRUCE ET AL.

Examiner

Melvin Curtis Mayes

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1734

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) 14-17 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-13, 18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 7/7/04.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_.

**DETAILED ACTION**

***Election/Restrictions***

(1)

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1-13 and 18, drawn to a method for bonding materials, classified in class 156, subclass 89.11.
- II. Claims 14-17, drawn to a multi component assembly, classified in class 428, subclass 210.

(2)

The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case, the product as claimed can be made by joining base materials by diffusion without a coating material, by using laser for heating or by placing in a microwave oven.

(3)

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

(4)

During a telephone conversation with Sally A. Farrett on November 2, 2004, a provisional election was made with traverse to prosecute the invention of Group I, claims 1-13 and 18. Affirmation of this election must be made by applicant in replying to this Office action. Claims 14-17 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

***Claim Rejections - 35 USC § 112***

(5)

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

(6)

Claims 1-13 and 18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The term "rapidly cooling" in claims 1 and 18 is a relative term which renders the claim indefinite. The term "rapidly" is not defined by the claim, the specification does not provide a

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standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. According to the specification, rapidly heating is on the order of approximately 100°C a minute, however there is no description of what is considered “rapidly cooling” such that one of ordinary skill in the art would be reasonably apprised of the scope of the invention. Is “rapidly cooling” of same or similar rate as “rapidly heating,” that being at rate of approximately 100°C a minute?

Claim 13 recites the limitation “said fixtures.” There is insufficient antecedent basis for this limitation in the claim. Fixtures are claimed in Claims 4 and 5.

Claim 4 claims “low temperature fixtures.” It is not clear from the specification what are considered “low temperature” fixtures.

### ***Claim Interpretation***

(7)

Claims 1 and 18 claim “slowly cooling said joint area to room temperature. The specification describes that the “joint area is then allowed to cool to room temperature.” For purposes of examination, “slowly cooling” is interpreted to mean that the joint area is allowed to cool to room temperature without forced cooling.

***Claim Rejections - 35 USC § 103***

(8)

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

(9)

Claims 1-7, 9-13 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rokhvarger et al. 6,054,700 in view of Meinhardt et al. 6,532,769 and Blake et al. 4,606,748.

Rokhvarger et al. disclose a method of joining ceramic parts comprising: coating a particulate ceramic composition on the surfaces of the ceramic parts to be joined; placing the coated surfaces together; focusing microwave energy at the joint between the ceramic parts to seal the joint by refiring and rereacting the ceramic composition between the parts. The ceramic parts may be composed of silicate materials, or oxide, nitride or carbide ceramics. The joint is surrounded by insulation (low temperature fixtures) which is in turn surrounded by a microwave furnace with microwave waveguides to deliver microwave energy to the joint. Weight may be used to enhance the sealing process. The microwave treatment process proceeds in accordance with a thermal schedule tailored to the thickness and ceramic properties of the parts then after thermal treatment, the parts are placed in ambient temperature to provide a cooling process (col. 2-7). Rokhvarger et al. do not disclose rapidly cooling the joint to a recrystallization temperature before cooling to ambient (room) temperature.

Blake et al. teach that in joining ceramic substrates by heating using microwave and using a glass sealing material, as a result of reaching higher temperatures during the sealing process, the sealing mixture's penetration into the substrates produces a homogenous microstructure with no zone of sealing material remaining where the two substrate surfaces were which results in a stronger seal (col. 3, lines 53-59).

Meinhardt et al. teach that in using a glass-ceramic such as frit to join ceramic components, before cooling the assembly to room temperature, the temperature is reduced to the crystallization temperature and held there until the seal crystallizes (col. 5, lines 55-58).

It would have been obvious to one of ordinary skill in the art to have modified the method of Rokhvarger et al. for joining ceramic parts by heating the joint such that the ceramic composition reacts and penetrates into the ceramic parts, as taught by Blake et al., to produce a homogenous microstructure with no zone of sealing material, thus resulting in a stronger seal. By using microwave for heating, the joint is rapidly heated to the temperature for rereacting the ceramic composition and allowing penetration into the ceramic parts to be joined to form a homogenous joint, as claimed. The particular temperature of softening the composition and the rate of heating as claimed would have been obvious to one of ordinary skill in the art as dependent on the ceramic parts and the particular ceramic composition, as Rokhvarger et al. disclose that the microwave treatment process proceeds in accordance with a thermal schedule tailored to the thickness and ceramic properties of the parts.

It would have been obvious to one of ordinary skill in the art to have further modified the method of Rokhvarger et al. by rapidly cooling to and maintaining the joint at a recrystallization temperature before cooling to ambient, as taught by Meinhardt et al., to crystallize glass-ceramic such as frit used to join ceramic components. The particular temperature and time of recrystallization of glass-ceramic frit, as claimed, would have been obvious to one of ordinary skill in the art as dependent on the composition.



(10)

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claim 1 above, and further in view of Loehman 4,347,089.

Loehman teaches that silicon nitride ceramics are joined by a glass or ceramic composition which reacts with the silicon nitride to form in the joint the same chemical constituents as found in the silicon nitride material by heating to about 1500-1700°C to melt the composition and maintaining at the temperature to permit reaction (col. 3, lines 5-15).

It would have been obvious to one of ordinary skill in the art to have modified the method of the references as combined by heating the joint area to a temperature in the range of 1500-1700°C, as taught by Loehman, for melting and reacting a composition with silicon nitride ceramics for forming in the joint the same chemical constituents as found in the silicon nitride material.

### ***Conclusion***

(11)

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

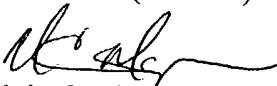
(12)

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Melvin Curtis Mayes whose telephone number is 571-272-1234. The examiner can normally be reached on Mon-Fri 7:30 AM - 4:00 PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chris Fiorilla can be reached on 571-272-1187. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Melvin Curtis Mayes  
Primary Examiner  
Art Unit 1734

MCM  
November 12, 2004